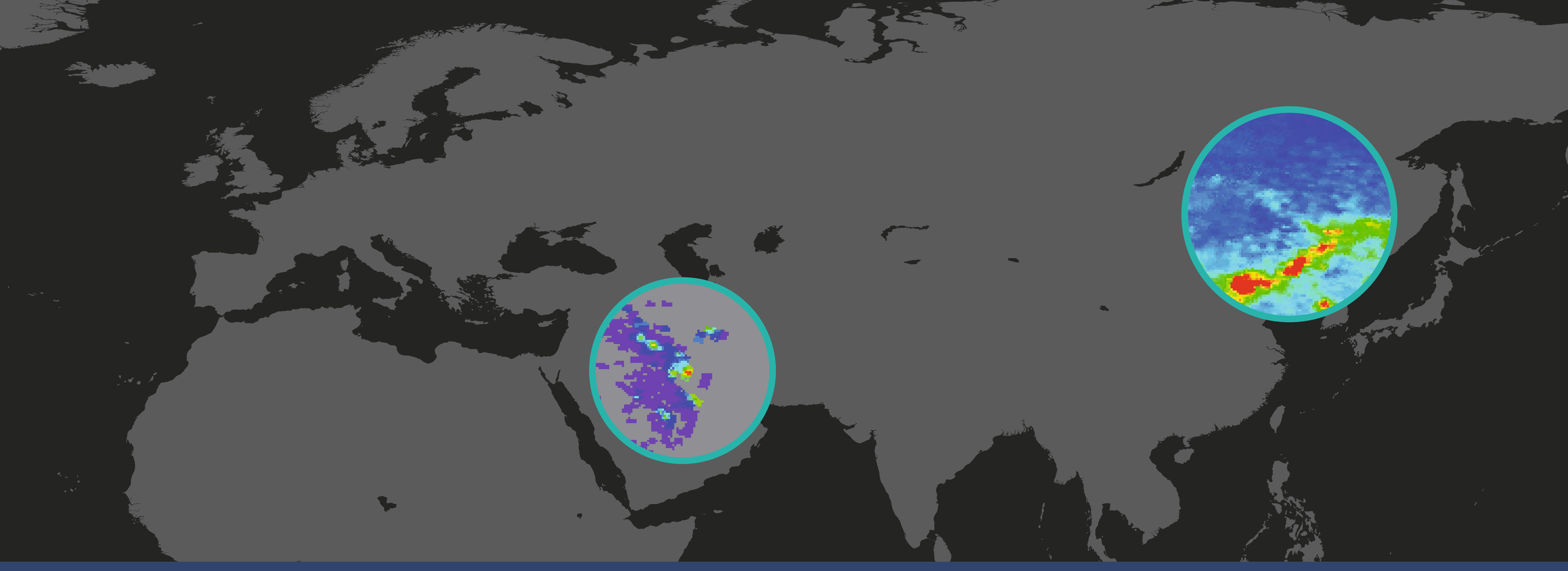


Earth Observation Center
German Remote Sensing Data Center

Sentinel-5 Precursor
Payload Data Ground Segment

Mission Overview

The Sentinel-5 Precursor mission acts as a very important transition mission in the time frame between Envisat and Sentinel-5. As a full GMES mission, it will fulfill demanding requirements of continuous product quality, near-realtime capability and dissemination and archiving of level 1 and level 2 data. The sensing instruments TROPOMI UV/VIS-Nadir and TROPOMI-SWIR-Nadir as well as the operational L1 and L2 processors will bring a significant improvement in precision and resolution of derived atmospheric composition data.

Project Objectives

The objective of this project is to develop a payload data ground segment for the Sentinel-5 Precursor mission which ensures that payload data is acquired, processed, archived and brought to use in an operational way. The DLR Sentinel-5 Precursor PDGS claims to serve and support the mission experts as well as the mission data users, and to preserve the Sentinel-5 Precursor data and derived information and knowledge for the long-term.

System Overview

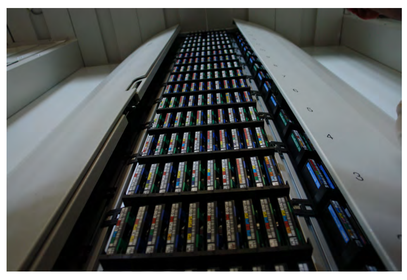
Figure 1 gives an overview of the S5P PDGS in the system context. The subsystems have the following functions:

Acquisition
- Ground Stations
- HKTM Processor
- DFEP
- SMCS
- Downlink Planning

Ground Station in Inuvik, Canada

- Processing
  - L0/L1/L2 NRT and Offline Processing
  - Calibration Database

- Archiving
  - Short-/Long-term Archive
  - Auxiliary Data Ingestion
  - Rolling Online Archive Access



Tape Library at DLR Oberpfaffenhofen

- Service Monitoring
  - System Monitoring and Control
  - Service Report Generation and Dissemination

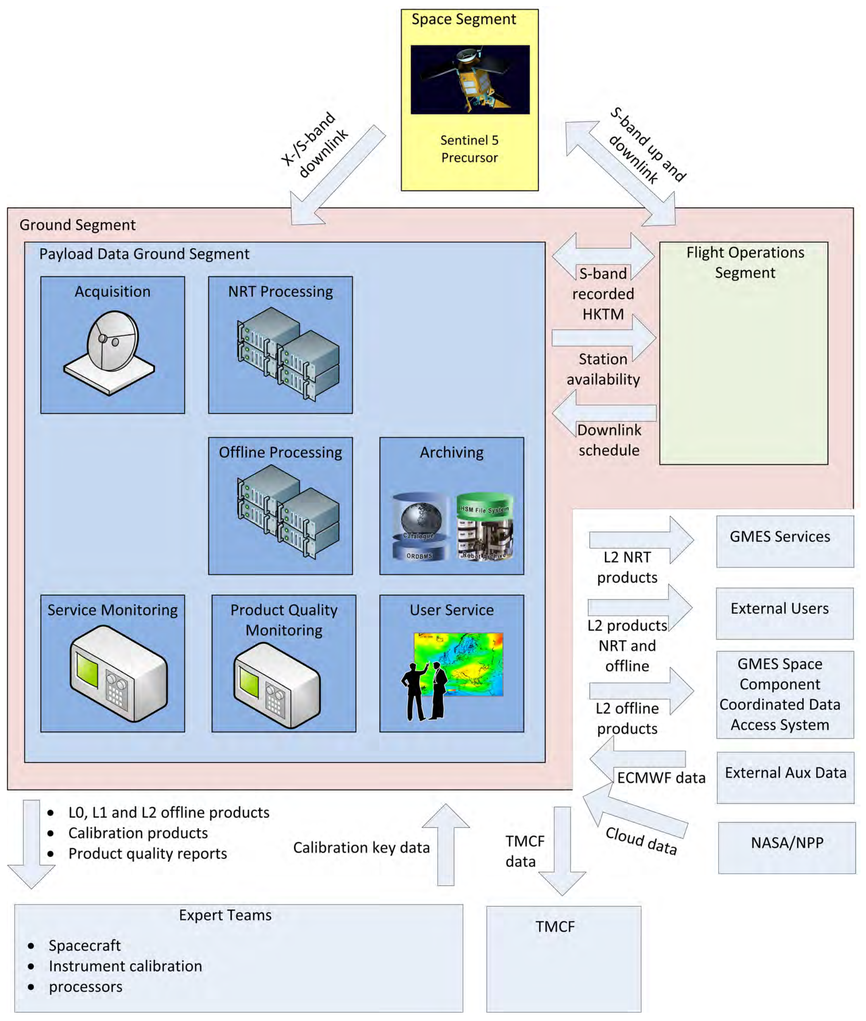


Figure 1: PDGS Architecture

- Product Quality Monitoring
  - Online Quality Monitoring
  - Scientific Product Quality Monitoring

- User Service
  - Catalogue Order and Delivery
  - L2 Product Access via OGC Web Mapping Services
  - Systematic Delivery of L2 Products

Data Flow

1. X-Band data is received by the Ground Station, ISP data is generated
2. The raw ISPs are transferred to PDGS processing facility and L0 products are generated
3. L1b products are generated using calibration data, calibration and quality information is extracted
4. L2 products are generated using NPP cloud data and auxiliary data (e.g. ECMWF analysed data)
5. Archiving of all products (L0, L1b, L2, Auxiliary)
6. L2 products are made available for selected users on pickup point

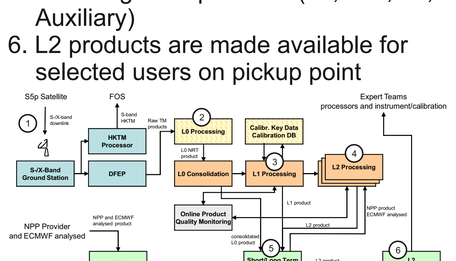


Figure 2: PDGS offline Data Flow

Key Requirements

- Mission lifetime of 7 years
- Delivery of NRT L2 products within 3 hours after sensing
- Complete production chain for L0, L1b and L2 products
- Handling of high data amount (see Table 1)

Mission lifetime	Data total increase	Total data volume
At Launch (L)	141.8 TB	141.8 TB
L L+1	453.7 TB	595.3 TB
L+1 … L+2	453.7 TB	1049.2 TB
L+2 … L+3	453.7 TB	1502.9 TB
L+3 … L+4	453.7 TB	1956.6 TB
L+4 … L+5	453.7 TB	2410.3 TB
L+5 … L+6	453.7 TB	2864.0 TB
L+6 … L+7	453.7 TB	**3317.7 TB**

Product level	Total volume per orbit
Level 0	15.7 GB
Level 1b	42.3 GB
Level 2	0.6 GB
Calibration data	14.3 GB
Total	72.9 GB

Table 1: Data Volume

Development Status

- S5P PDGS Kick-Off was conducted in February 2012
- Currently working on PDGS system requirements (Ground Segment level System Requirement Review started mid-June)
- Afterwards extensive work on PDGS design

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